Zachodniopomorski Uniwersytet Technologiczny w Szczecinie

Faculty of Chemical Technology and Engineering

| Field of study | | Chem | nical Engineering | | | | | | | |
|--------------------------|---|--|---------------------|-----------------------|------------------|------------|-------------|--|--|--|
| Mode of study | | statio | onary | \ | | | | | | |
| Graduate's qualification | | inżyn | Ch | | | | | | | |
| Area(s) of study | | nauk | _ | | | | | | | |
| Educational profile | | gene | | | | | | | | |
| Module | | | | | | | | | | |
| Course un | it | Advanced Chemical Technology | | | | | | | | |
| Code | | ChEn | | | | | | | | |
| Field of sp | ecialisation | | | | | | | | | |
| Administer | ring faculty | Polyn | ner Institute | | | | | | | |
| FCTS | ing faculty | $\begin{array}{c} P(0) \\ P(0) \\ P(TS) \\ P(TS) \\ P(0) \\ P(TS) \\ P(0) \\ P(TS) \\ P(0) \\ P(0) \\ P(TS) \\ P(0) \\ P(TS) \\ P(0) \\ P(TS) \\ P(0) \\ P(TS) \\ $ | | | | | | | | |
| Eorm of co | urse credit | 9,0 | | Language english | | | | | | |
| Floctivos | | | | Elective group | | _ | | | | |
| Electives | | / | Elective group | | | - " | | | | |
| Form of in: | struction | Code | Semester | Hours | ECTS | Weight | Credit | | | |
| lecture | | W | 5 | 30 | 3,0 | 0,40 | examination | | | |
| lecturing c | ourse | Α | 5 | 30 | 2,0 | 0,30 | credits | | | |
| project cou | urse | Р | 5 | 60 | 4,0 | 0,30 | credits | | | |
| Leading te | acher | El Fra | y Mirosława (Mi | roslawa.ElFray@zu | ıt.edu.pl) | | | | | |
| Other teachers | | Czech Zbigniew (psa_czech@wp.pl), El Fray Mirosława (Miroslawa.ElFray@zut.edu.pl), Kowalczyk Agnieszka (Agnieszka.Kowalczyk@zut.edu.pl), Tryba Beata (Beata.Tryba@zut.edu.pl) | | | | | | | | |
| Prerequisit | tes | | | | | | | | | |
| W-1 | basic knowledge in | mater | ials science and er | ngineering; basic che | emical processes | | | | | |
| Module/co | urse unit objective | e <i>s</i> | | | | | | | | |
| C-1 | The course is aimed at gving an overview of advanced cheimila technologies. Student will be able to define basic processes, including water purification, polymers and composites processing, oxidation processes, etc. | | | | | | | | | |
| Course coi | ntent divided into various forms of instruction Number of hours | | | | | | | | | |
| T-W-1 | Technology of poly | echnology of polymer fibres and nanofibres | | | | | | | | |
| T-W-2 | Rubber technology | ber technology | | | | | | | | |
| T-W-3 | Thermoplastic elas | lastic elastomers technology | | | | | | | | |
| T-W-4 | Polymer resins for | r resins for composite materials | | | | | | | | |
| 1-W-5 | Advanced function | nced functional polymers for medical technologies | | | | | | | | |
| T-VV-0 | History and develo | Fechnology of adhasives and pressure sensitive adhesive (PSA) materials | | | | | | | | |
| T-W-8 | History and development of PSA materials technology, polymers suitable for PSA 2 Supplexity and modification PSA crosslipking of PSA 2 | | | | | | | | | |
| T-W-9 | Coating and testing of PSA performance, measurement of tack, peel adhesion, shear strength and | | | | | | | | | |
| T-W-10 | ndustrial application of self-adhesive products 2 | | | | | | | | | |
| T-W-11 | Production and application of the photoreactive materials for air purification | | | | | | | | | |
| T-W-12 | Modern technologie | chnologies of water treatment 2 | | | | | | | | |
| T-W-13 | Advanced oxidation | ced oxidation processes applied in water technology 2 | | | | | | | | |
| T-W-14 | Modern technologie | ern technologies of hydrogen production 2 | | | | | | | | |
| T-W-15 | Application of phot | tion of photovoltaic cells for energy production 2 | | | | | | | | |
| T-A-1 | Determination of p | nination of polymer crystallinity 2 | | | | | | | | |
| T-A-2 | Determination of mechanical parameters of polymers and composites 4 | | | | | | | | | |
| T-A-3 | Calculations of polymer crosslinking density 2 | | | | | | | | | |
| T-A-4 | reverse engineering of polymeric materials 2 | | | | | | | | | |
| T-A-5 | Evaluation of PSA's Tg | | | | | | | | | |
| 1-A-6 | Selection of suitabl | 2 | | | | | | | | |
| 1-A-/ | Determination of average number of carbon atoms in alkyl groups 2 Modification of PSA using soft and bard resins 4 | | | | | | | | | |
| 1-4-0 | Modification of PSA using soft and hard resins 4 | | | | | | | | | |

| Course cor | urse content divided into various forms of instruction | | | | | | | | | | | |
|---|--|--|--|--|---|----------------------|---|---|---------------------|-----------------------|--|--|
| T-A-9 | Calculations of yield of chemical reactions and processes appied in technology | | | | | | | | | 4 | | |
| T-A-10 | Calcula | tions of kinetics of chemical reactions | s used in techno | logial process | es | | | | 2 | | | |
| T-A-11 | Calculations of economics for selected technologial processes | | | | | | | | | 2 | | |
| T-A-12 | Calculations of material balances for technologial processes | | | | | | | | | 2 | | |
| T-P-1 | Industrial project on the synthesis and modification of thermoplastic elastomers | | | | | | | | | 20 | | |
| Т-Р-2 | Industr based l | 20 | | | | | | | | | | |
| Т-Р-З | Perforn | | 20 | | | | | | | | | |
| Student wo | ent workload - forms of activity | | | | | | | | | | | |
| A-W-1 | Particip | 30 | | | | | | | | | | |
| A-W-2 | Prepara | 30 | | | | | | | | | | |
| A-W-3 | Individual literature studies | | | | | | | | | 30 | | |
| A-A-1 | Participation in classes | | | | | | | | | 20 | | |
| A-A-2 | Preparation for classes | | | | | | | | | 20 | | |
| A-A-3 | Individual tasks solving | | | | | | | | | 20 | | |
| A-P-1 | Participation in project exercises | | | | | | | | 60 | | | |
| A-P-2 | Development of project tasks | | | | | | | | 30 | | | |
| A-P-3 | Writting | g and documenting the project | | | | | | | | 30 | | |
| Teaching n | hing methods / tools | | | | | | | | | | | |
| M-1 | Lecture | | | | | | | | | | | |
| M-2 | Discussion | | | | | | | | | | | |
| M-3 | Projects writting | | | | | | | | | | | |
| Evaluation | metho | ds (F - progressive, P - final) | | | | | | | | | | |
| S-1 | F | Written exam (lecture) | | | | | | | | | | |
| 5-2 | F Written project | | | | | | | | | | | |
| Designed learning outcomes | | | Reference to the learning outcomes designed for the fields of study | Reference to the learning outcomes defined for the particular areas of education | Reference to learning outcomes leading to the degree of "inżynier" | Course objectives | Course co | ontent | Teaching methods | Evaluation methods | | |
| Knowledge | , | | | | | | | | | | | |
| ChEn_1A_C18b_W01 Student has knowledge in advanced chemical technologies, including water purification, oxidation, polymers synthesis and processing, useful for solving basic tasks within the scope of chemical engineering | | | ChEn_1A_W07 ChEn_1A_W12 ChEn_1A_W14 | P6S_WG_TA11 | P65_WG_IA11 | C-1 | T-W-1 T-W-2 T-W-3 T-W-4 T-W-5 T-W-6 T-W-6 T-W-7 T-W-8 | Г-W-9 Г-W-10 Г-W-11 Г-W-12 Г-W-13 Г-W-14 Г-W-15 | M-1 | S-1 | | |
| Skills | | | | | | | | I | | <u>I</u> | | |
| ChEn_1A_C18b_U01 Student is albe to design the processes as well as interpret thier significance from the application point of view | | | ChEn_1A_U01 ChEn_1A_U03 ChEn_1A_U05 ChEn_1A_U07 ChEn_1A_U08 ChEn_1A_U16 | P6S_UO P6S_UU P6S_UW_TA11 P6S_UW_TA14 | P6S_UW_IA11 P6S_UW_IA14 | C-1 | T-A-1 T-A-2 T-A-3 T-A-4 T-A-5 T-A-6 T-A-7 T-A-8 | Г-А-9 Г-А-10 Г-А-11 Г-А-12 Г-Р-1 Г-Р-2 Г-Р-3 | M-2 M-3 | 5-2 | | |
| Other socia | al / per | sonal competences | | | | | | | | | | |
| ChEn_1A_C18 Student is able leader; he/she | b_K01 e to work e is able t | c in a group and perform as a group to estimate the time necessary to | ChEn_1A_K01 ChEn_1A_K03 ChEn_1A_K04 ChEn_1A_K04 | P6S_KK P6S_KO P6S_KR | | C-1 | T-P-1 T-P-2 | Г-Р-З | M-2 | 5-2 | | |
| | assigne | | | | | | <u> </u> | | | | | |
| 1. D. Hull T.W. Clypp. An introduction to composite materials. Combridge University Press. Combridge 2012 | | | | | | | | | | | | |
| 2. H. Irie, D.A. Tryk, X. Zhang, Handbook of Self-cleaning Surfaces and Materials: from Fundamentals to Applicationss, Wiley-VCH Verlag | | | | | | | | | | | | |
| GMDH, 2011 3 M L Stefan, Advanced ovidation processes for water treatment: fundamentals and applications, IWA Publishing, 2017 | | | | | | | | | | | | |
| 3. №1.1. Stefa | | nceu oxidation processes for water tr | | nentais and a | Phications, IV | VA PUDI | isning, 20 | 11/ | | | | |
| 4. S.C. AIIIE | .a rtaksi | | ige. photochemi | cai moues, CR | C FIESS, 2015 | , | | | | | | |
| Supplementary reading | | | | | | | | | | | | |
| 1. I.M. Ward | , S. Swe | eney, An introduction to the mechan | ical properties of | t solid polyme | rs, John Wiley | & Sons | , Ltd., Ch | licheste | er, 2004 | 4 | | |